Population health in a digital age: Patterns in the use of social media in Wales

Song, Jiao ; Sharp, Catherine; Davies, Alisha R

Published: 28/01/2020

Publisher's PDF, also known as Version of record

GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

PRIFYSGOL BANGOR UNIVERSITY

Population health in a digital age

Patterns in the use of social media in Wales

Jiao Song, Catherine A. Sharp, Alisha R. Davies

Population health in a digital age

Patterns in the use of social media in Wales

Authors

Jiao Song[1], Catherine A. Sharp[2], Alisha R. Davies[1]

Affiliations

1. Research and Evaluation Division, Knowledge Directorate, Public Health Wales
2. Public Health Collaborating Unit, School of Health Sciences, Bangor University

Acknowledgements

We would like to thank the public in Wales for taking part in this survey. We would also like to thank the following; Dr Victoria Goodyear (University of Birmingham), Dr Netta Weinstein (Cardiff University), and our colleagues within Public Health Wales, Jonathan West and Dr Daniel Thomas who peer-reviewed and provided valuable comments on earlier drafts on this report. We would like to thank Prof Mark A. Bellis and Lucia Homolova for their inputs into the survey and colleagues in Public Health Wales who supported report production including Dr Diana Bright, Dr Charlotte Grey, Elysha Rhys-Sambrook and Ceri Smith. Lastly, thank you to BMG Research who completed the data collection.

Suggested Citation

Song J, Sharp CA, Davies AR (2020). Population health in a digital age: Patterns in the use of social media in Wales. Public Health Wales & Bangor University.

ISBN: 978-1-78986-154-56

Funded by Public Health Wales

Public Health Wales is an NHS organisation providing professionally independent public health advice and services to protect and improve the health and wellbeing of the population of Wales. Production of this report was funded by Public Health Wales.

Foreword

Social media is ever present in today's culture, with growing interest in the use of social media to support action to promote and protect health, share health information and inform the development of population health systems.

Whilst the majority of us are increasingly going online, there are many who do not, raising important questions on equity. To address this, we carried out the first nationally representative survey exploring social patterns in engagement with digital technology for health purposes. Our first report published earlier this year, **"The use of digital technology to support and monitor health in Wales"**, highlighted that those who potentially have the greatest health needs are those who are digitally excluded, and less likely to engage with internet-enabled technology to support health. Those in our society who are of older age, living in the least affluent areas of Wales, with more health-harming behaviours (smoking, less active, or regularly binge drinking alcohol) and living with poorer general health, are all less likely to engage with technology to support health.

This is our second report in our series on **Population health in a digital age** and focuses on social media use in Wales. These insights help us to better understand the extent to which people in Wales use social media, and how patterns of use vary across population groups. The findings challenge some preconceptions (for example, that only younger age groups engage with social media), and identify opportunities warranting further consideration (for example, that engagement in social media can transcend levels of deprivation and reach wider audiences).

Our findings reinforce the need for continued development of evidence-based digital health technologies, underpinned by behavioural insights, to understand why and how people engage in social media. This report also challenges us to learn how people choose to engage with social media, and how to best harness the opportunities and protect against the unintended consequences of social media on health and inequalities.

Síân Bolton
Transition Director,
Knowledge Directorate,
Public Health Wales

Use of social media in Wales

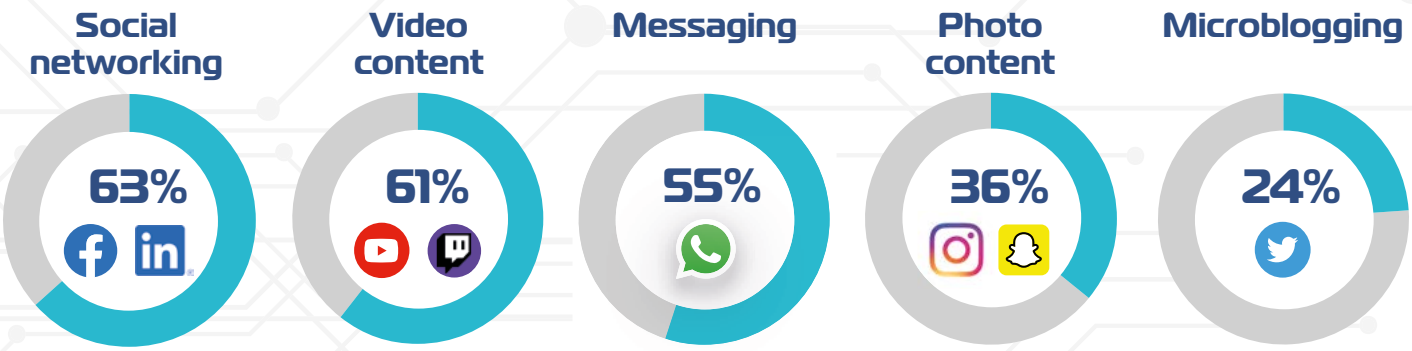
A nationally representative household survey asked 1,252 individuals aged 16+ years, resident in Wales, about how they use social media.

8 in 10[a] people in Wales use social media

1 in 10[a] people who have internet access do not use social media

1 in 10[a] people do not access the internet

Which type of social media do people use?



The proportion of people[b] with internet access using social media

By gender[c]

91% Women

86% Men

By age group[c]

99.6% 16-29 year olds

60% 70+ year olds

By deprivation quintile[d]

88% Most deprived

90% Least deprived

By general health[c]

90% Average

85% Low

By mental wellbeing[d]

89% Average

86% Low

By HHBs[c,e]

91% 0 HHBs

84% 2-3 HHBs

[a]Weighted to the population Welsh Index of Multiple Deprivation 2015; [b]Proportion adjusted to the sample mean for age, gender and deprivation. See report for full details; [c]Differences between groups presented were found to be statistically significant ($p<0.05$); [d]Differences between groups presented were not found to be statistically significant ($p>0.05$); [e]HHB = Health-harming behaviour (smoking, binge drinking, physically inactive).

The information in this infographic is taken from the report:
Population Health in a digital age. Patterns in the use of social media in Wales. Song J, Sharp CA, Davies AR (2020).
Public Health Wales & Bangor University.
Available from: https://phw.nhs.wales/topics/digital-technology-and-health/

GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

@PublicHealthW

PRIFYSGOL BANGOR UNIVERSITY

@BangorUni

Contents

Executive summary

Background

- Social media is a global phenomenon, enabling the instantaneous information sharing between groups, facilitation of sharing user-generated content, and creating and participation in social networks.
- There is growing interest in the use of social media to support action to promote and protect health, share health information and inform the development of digitally delivered health systems. There is some evidence of gender and age differences in the engagement with social media in the United Kingdom, but robust evidence of the patterns of social media use across population groups, and differences by health status is lacking.
- **To maximise the opportunities of social media to improve or protect health and reduce heath inequalities, we need to understand the extent to which people in Wales use social media, and how patterns of use vary across population groups.**
- The Digital Technology and Health survey was undertaken in 2018 through face-to-face interviews with a national sample of 1,252 residents in Wales aged 16 years and above. The questionnaire covered the following topics: (i) access to the internet and/or digital technology, (ii) use of social media platforms, (iii) perceptions of sharing health related information on social media, (iv) health status and (v) demographics.
- Of the eligible households visited by an interviewer, 70% participated in the study. Analyses were completed on the **population sampled**, and then sub-analyses were limited to **people with internet access only** to understand the level of engagement with **social media** in the population, and differences by age, gender, deprivation and health status. Analyses also explored the differences in **social media platform** use and **user categories** across groups (for defined terms see Box A).
- This is the second report in a series of publications on *Population Health in a Digital Age* and focuses on better understanding who in Wales uses which types of social media platforms.

Box A: Key terms and definitions

- **Internet access** was defined as access to the internet via all devices including mobile phones, computers, tablets, personal assistant technology and wearable devices at home, work or elsewhere.
- **Population sampled** included (a) ***people with internet access***, and (b) ***people without internet access*** (individuals who never accessed the internet at home, work or elsewhere on a phone, tablet, computer or voice controlled personal assistant, never use wearable technology, see Appendix 1).
- **People with internet access** were defined as individuals who went online at home, work or elsewhere for any purpose.
- **Social media platforms** included Twitter, Facebook, LinkedIn, Instagram, YouTube, WhatsApp, SnapChat and Twitch.
- **Types of social media platforms** included social networking, photo content, video content, microblogging and messaging.
- **User categories** on social media included super users, users, rare users and non-users. People without Internet access were a standalone category.

Findings

Social media platform engagement (see Section 3.1)

76.9% of the Welsh population aged 16+ years used one or more social media platform. Those not using social media included 13.8% of the population who did not have internet access to use a social media platform, and 9.3% who were online but did not engage with social media. Overall, 64.7% of the population of Wales used at least one social media platform on a daily basis. The most frequently used social media platforms were Facebook, WhatsApp and YouTube (Table A).

Table A. Proportion of the population in Wales (16+ years) who reported using social media

	Daily	Weekly	<Weekly	No use[i]
At least one platform	64.7	8.1	4.1	9.3
Facebook	50.6	8.4	3.2	23.9
WhatsApp	39.4	10.9	4.8	31.2
YouTube	24.4	19.0	17.0	25.7
Instagram	18.7	6.1	6.0	55.4
Snapchat	15.2	4.2	4.2	62.6
Twitter	11.1	5.1	7.8	62.2
LinkedIn	3.2	4.0	7.2	71.7
Twitch	1.3	1.2	2.3	81.0

[i]No use does not include people without internet access to use social media.

Box B. Social media platform types

Type of social media platform	Social media platform
Messaging	WhatsApp
Microblogging	Twitter
Video content	YouTube
	Twitch
Photo content	Instagram
	Snapchat
Social networking	Facebook
	LinkedIn

Differences in the use of social media platform types and by population groups in Wales (see Section 3.2)

Limiting to people with internet access within the sample, a higher proportion of women (91.2% compared to 85.7% of men) engaged with one or more type of social media platform. Differences were found in the types of social media platforms (see Box B) used between men and women. A higher proportion of women than men used social networking (76.9% and 68.7% respectively), messaging (66.7% and 60.9%) and photo content (44.9% and 34.0%) platforms; whereas a higher proportion of men used video content (72.2% compared to 65.0%).

Almost all (99.6%) 16-29 year olds with internet access were on social media. Engagement with social media did decline with increasing age, but use of social media remained high in the older age groups. Three quarters (75.6%) of 60-69 year olds and three fifths (59.8%) of 70+ year olds reported using one or more type of social media platform.

For social networking, video or photo social media platforms, proportions of use were similar across deprivation groups, but a lower proportion of those most deprived reported using microblogging and messaging types of social media platforms

A lower proportion of those with low self-reported general health (84.8% compared to 89.9% of those reported average) and a lower proportion of those with 2-3 health-harming behaviours (HHBs) (84.2% compared to 91.2% of those with 0 HHB reported) used one or more type of social media platform.

Similar proportions were found between average and low mental wellbeing on the use of any type of social media platform.

Differences in social media user categories and by population groups in Wales (see Section 3.3)

Limiting to people with internet access within the sample, a higher proportion of women (76.7% and 71.8% respectively) were super users (see Box C). Whilst the proportion of super users declines with age, approximately half (53.8%) of those aged 60-69 years, and a third (31.3%) of those aged 70+ years were super users on one or more social media platform.

The distribution of the population sampled across the social media user categories were similar regardless of their deprivation quintiles, and levels of mental wellbeing. A lower proportion of people with low general health were super users compared to people reported average general health (71.3% and 76.9% respectively).

Box C. Social media user category

Responses on highest frequency of social media use, irrespective of the platform.

Super user	several times a day; daily
User	weekly
Rare user	less than weekly
Non-user[i]	never used; don't know what it is

[i]Non-users do *not* include people without internet access to use social media.

Differences in people who shared personal health information on social media platforms (see Section 3.4)

Within the population sampled, 9.6% of people with internet access shared personal details about their health on social media platforms. Of these people, the majority (73.5%) reported only sharing with friends and family, and the remaining (26.5%) shared with friends & family and people they did not know. The proportion of those who were concerned about their privacy was similar for people who shared with friends and family only, and those who shared with both parties.

Conclusions

- Social media has the potential to be an important tool for public health, with an increasing proportion of the population communicating through social networks online. This is the first population-based survey in Wales exploring differences in the engagement with social media across platforms and population groups. These findings provide valuable insights which can inform the development, application and of social media platforms for health. Engaging with social media is a common activity in Wales. 76.9% of the Welsh population reported they used one or more social media platform, but 13.8% of the Welsh population did not have internet access to use social media. **These digital inequalities need to be taken into account when considering the benefits and limitations of internet-enabled technologies to support health.**

- The gender and age patterns in social media engagement in Wales are comparable to other UK studies which have reported higher use of social media in women, and lower use with increasing age. **Social media is often considered within the context of younger populations, whereas these findings have highlighted that a high proportion of those in the older age groups do engage with social media.**

- In this study, we were able to explore age, gender and deprivation related differences by social media platform, and found that the different platforms reach different audiences. **Health communication should take into consideration these differences in use of social media platforms across population groups; for example, the potential to use video content to target men on health and wellbeing, or use social media networking sites to span across age groups.**

- Taking internet access into consideration, there was no overall difference in social media use by deprivation group in Wales after excluding those without access to the internet; but there was a difference by type of social media platform, with significantly lower levels of engagement with microblogging and messaging in those least affluent. **The potential for social media to reach more deprived populations has been reported in the USA, and whilst the findings in this survey do support that finding, we have also shown it is important to consider the type of platform.**

- 64.7% of the Welsh population were super users of social media, irrespective of levels of self-reported general health and mental wellbeing. Many studies have explored how social media offers people the opportunity to communicate and interact with others and find and receive information about health conditions, whereas others highlight concerns about the credibility and validity of information online. **There needs to be further exploration of the potential benefits of social media to support health and wellbeing, alongside identifying and protecting against the potential harms.**

- There is increasing interest in the potential value of user-generated content to support public health. However, there are many limitations including the validity of data, ethics of capture and, as demonstrated by the findings in this report, underlying social differences in access and engagement with the internet and social media which need to be taken into account.

There remains much to learn about the role of social media in health, both beneficial and harmful but understanding that variation in access to technology, education, and broader socio-political context remains important. With an increasing use of public services to move towards digital channels, we need to continue efforts to address inequalities in access, but recognise that social media may offer a platform to reach a wider audience and engage differently with populations about health. At present, health systems largely use social media as another channel to share information, but this approach does not capitalise on the reason social media works - the social networking element. Health systems need to engage in conversations to support high attentiveness and appeal with their audiences; to deliver effective health behaviour change addressing beliefs, attitudes, intentions and behaviour, as well as just improving knowledge and awareness.

1. Introduction

"Social networks are fundamental to human society, and digital technologies have accelerated their formation" (World Bank, 2016, p.148)[1].

Our first report in this series, Population Health in a Digital Age, reported two thirds of the population of Wales used internet-enabled technologies from mobile phones, computers and wearables to support their health through a wide range of activities; and there were marked differences in use by age, gender, deprivation and underlying health status[2]. Understanding these patterns is essential to better inform the application of digital technologies to health promotion, prevention, and care, and to prevent against the unintended harms of a focus on digital solutions excluding those who have the greatest need.

Box 1. What is social media?

Social media enables the instantaneous information sharing between groups, facilitation of sharing user-generated content, and creating and participation in social networks.

Social media platforms are internet-based applications such as Facebook and Instagram that allow individuals to create and share messages, photos, and videos, with an online community. This is an exchange of user-generated content.

[Adapted from Kaplan & Haenlein (2010)][3]

In this report, we focus specifically on identifying patterns of social media use in Wales (see Box 1)[3]. Social media is a global phenomenon. In January 2019, it was estimated that more than 3.5 billion people across the world are actively using social media, an increase of 9% increase from 2018[4]. There is growing interest in the use of social media to support action to promote and protect health, share health information and inform the development of digitally delivered health systems[5,6]. There is some evidence of gender and age differences in the engagement with social media in the United Kingdom (UK)[7], but robust evidence of the patterns of social media use across population groups, and differences by health status, is lacking.

Members of the public are engaging with health-related content on social media platforms, and value the access to personal stories and information from members of the public or patients (i.e. user-generated content), shared and tailored information is more accessible and readily available, including access to peer and emotional support[5]. In the UK, over 90% of 16 to 24 year olds have a social media profile, but this declines to 20% amongst those aged 75 years and older[7]. In Wales, approximately 25% of the population (aged 16+ years) often use social media platforms to search for health information, similar to those visiting the pharmacist or looking on the NHS website[8].

Health professionals are also interested in the use of social media both as a channel to target messaging, and to capture the user-generated content to inform real time control of infectious diseases and response to threats to health[5,6]. The low cost and viral spread of information makes social media an attractive option for health communication[5,9], and a greater understanding of underlying levels of engagement with social media across population groups is needed.

Evolving engagement with social media, and the many other options for online content directed to individuals and groups (e.g. in-game advertisement, Google® analytics) also has the potential to influence social norms and help deliver health information to wider population groups than before[10]. Social media has the potential to reach those who may face barriers or dis-engage with healthcare or health information, due to language, accessibility, stigma, or specific populations at risk[11]. For example, in a representative sample of American adults, a higher proportion people with lower education and income levels and ethnic minority groups were found to be social media users[12]; and Facebook has been shown to be a cost-effective recruitment source for young adult smokers into smoking cessation programmes in the United States of America (USA)[13].

To maximise the opportunities of social media to improve or protect health and reduce heath inequalities, we need to better understand who in Wales uses which types of social media platforms. The aim of this report is to address those challenges, provide an understanding of who uses social media, discloses personal health information through social media platforms, and how patterns of use vary across different population groups and by underlying health.

2. Methods

A nationally representative household sample of residents in Wales aged 16 years and older were identified by a random probability sampling approach[2]. One individual per household was randomly invited to complete a face-to-face questionnaire delivered by a professional market research company between April and June 2018 using Computer Assisted Personal Interviewing (CAPI). A total of 1,252 questionnaires were completed with 69.5% compliance rate. After exclusion of those with missing demographic data, the final population sample size was 1,240 (see Appendix 1).

The population sampled included (a) people with internet access (i.e. individuals who went online at home, work or elsewhere for any purpose; 85.4% [n=1,059]), and (b) people without internet access (those who never accessed the internet at home, work or elsewhere on a phone, tablet, computer or voice controlled personal assistant, never used wearable technology; 14.6% [n=181], see Box 2, Appendix 1). Where specified, sub-analyses on people with internet access were conducted to understand the differences across population groups.

Throughout the report the key terms used are described in Box 2 for ease of reference.

Box 2: Key terms and definitions used in this report

- **Internet access** was defined as access to the internet via all devices including mobile phones, computers, tablets, personal assistant technology and wearable devices at home, work or elsewhere.
- **Population sampled** included (a) ***people with internet access***, and (b) ***people without internet access*** (individuals who never accessed the internet at home, work or elsewhere on a phone, tablet, computer or voice controlled personal assistant, never use wearable technology, see Appendix 1).
- **People with internet access** were defined as individuals who went online at home, work or elsewhere for any purpose.
- **Social media platforms** included Twitter, Facebook, LinkedIn, Instagram, YouTube, WhatsApp, SnapChat and Twitch.
- **Types of social media platforms** included social networking, photo content, video content, microblogging and messaging.
- **User categories** on social media included super users, users, rare users and non-users. People without internet access were a standalone category.

Measures used in the questionnaire

The questionnaire collected quantitative information on respondents on the following topics: use of social media platforms (irrespective of the device used; see Box 3), perception of sharing personal health information on social media platforms (see Box 5), health status and health behaviours (see Box 6), and socio-demographic information.

To report the extent which people engaged with social media, we aggregated social media platforms into five *types of social media platforms* based on their functions[14] (see Box 3).

Individuals reported their frequency of use for individual social media platforms, and these responses were categorised into five *user categories*[15] (see Box 4). Where an individual reported using more than one type of social media platform within a single type of platform (e.g. photo content), the user frequency from the highest of the two platforms (e.g. Instagram or Snapchat) was used to assign the user category.

Socio-demographic information (e.g. gender, age group) was self-reported and 2015 Welsh Index of Multiple Deprivation (WIMD) quintile was assigned based on respondent's residential postcode recorded at interview (see Appendix 1). Information on self-reported general health, mental wellbeing and three health-harming behaviours (HHBs; currently smoking, regularly binge drinking and 0-1 day physical activity per week) were collected using validated tools, where possible, or adapted from national surveys (see Box 6). Further details on the questions are provided in Appendix 1. Analysis on other variables will be presented in future publications.

Box 3. Social media platforms explored, type of social media platform, and user category based on frequency of social media use

Social media platform explored	Type of social media platform
WhatsApp	Messaging
Twitter	Microblogging
YouTube	Video content
Twitch	
Instagram	Photo content
Snapchat	
Facebook	Social networking
LinkedIn	

Box 4. User category based on frequency of social media use

User category	Responses on frequency of social media use per platform
Super user	several times a day; daily
User	weekly
Rare user	less than weekly
Non-user[i]	never used; don't know what it is

[i]Non-users do *not* include people without internet access to use social media.

Box 5. Questions related to sharing personal health information on social media

Questions	Responses
Do you ever share personal details about your health on social media with	
(a)…your friends and family?	Yes
(b)…people you do not know (e.g. public sites)?	No
Do you worry about your privacy when sharing information about your health on social media with	
(c)…your friends and family?	Yes
(d)…people you do not know?	No

Box 6. Single questions asked to obtain health-related information

Health	Question	Categories *(Responses)*
Binge drinking frequency[i]	In the last year how often have you had 6 or more alcoholic drinks in a single drinking occasion?	Regularly *(daily; weekly)* Occasionally *(monthly; less than monthly)* Never *(never; I don't drink at all)*
Smoking status[ii]	In terms of smoking tobacco, which of the following best describes you?	Current *(I smoke daily; I smoke occasionally but not daily)* Ex-smoker *(I used to smoke but do not smoke at all now)* Never *(I have never smoked)*
Physical activity levels[iii]	On how many days each week do you engage in at least 30 minutes physical activity (enough to make you out of breath and sweat)?	0-1 day *(never; 1 day or less)* 2-4 days *(2-4 days)* 5+ days *(5 days or more)*
Mental wellbeing[iv]	From the Short-Warwick and Edinburgh Mental-Wellbeing Score	Average Low *(Raw scores converted to metric score and categorised into* average *and low. Individuals who did not answer all 7 statements were not assigned a wellbeing score).*
Self-reported general health[v]	If 100 is the best state of health you could possibly imagine and 0 is the worst state of health you can imagine, how good or bad is your own health generally?	*Low (0-60; ≤ 25th percentile)* *Average (61-84; > 25th - <75thpercentile)* *High (85-100; ≥ 75thpercentile)* *(Response derived from 0-100 visual analogue scale)*

[i]Adapted from AUDIT-C tool. [ii]National Survey for Wales https://gov.wales/national-survey-wales;
[iii]Scottish Physical Activity Screening Questionnaire http://www.paha.org.uk/Resource/scottish-physical-activity-screening-question-scot-pasq;
[iv]Short Warwick and Edinburgh Mental Wellbeing Score conversion using https://warwick.ac.uk/fac/sci/med/research/platform/wemwbs/development/swemwbs/ [Accessed 20/11/2018] categorised into average and low (calculated as the mean -1 standard deviation).
[v]Question adapted from the EQ-5D https://euroqol.org/publications/user-guides/ categorised into three levels of health status.

Data analysis

Estimates of the proportion of the Welsh population (aged 16+ years) who engaged with social media platforms were based on the population sample (N=1,240), weighted to the demographic distribution of the Welsh population[a].

Analyses on people with internet access (n=1,059) were conducted to understand differences in social media engagement across different population groups. We tested the relationships between user categories and demographics (i.e. gender, age group, deprivation quintile) and health status (i.e. self-reported general health, mental wellbeing, HHBs) across types of social media platform using Chi-squared test or Fisher's exact test. The adjusted proportion of people with internet access who reported frequency of using social media platforms was determined using a generalised linear model, to calculate corresponding adjusted mean controlling for gender, age group and deprivation quintiles (using estimated marginal means and 95% confidence intervals shown in Appendix 4 and 5). A p-value of < 0.05 was considered statistically significant.

[a] Using mid-2015 population estimates for Lower Super Output Areas (LSOAs) by gender, age group (ONS, 2016) and deprivation quintile (WIMD; Welsh Government, 2015).

3. Findings

3.1. Do people engage with social media platforms in Wales?

Participants (n=1,240) were asked which of the eight specified social media platforms explored have they used, and how often they had used them (see Box 3 and 4).

Key messages:

- **76.9% of the Welsh population used one or more social media platforms.**
- **64.7% of the Welsh population used at least one social media platform on a daily basis.**
- **Facebook was the most commonly used social media platform with 50.6% of Welsh population reporting using it on a daily basis.**

3.1.1 Differences in use of social media platforms

Within the Welsh population

Overall, 76.9% of the population of Wales reported they used one or more social media platforms. While 9.3% of the population chose not to engage with any social media platforms (including those who did not know what the platform was), despite having internet access. The remaining 13.8% of the population did not have internet access and therefore did not have access to social media platforms. When considering the frequency of use, 64.7% of the population of Wales used one or more social media platform on a daily basis; 8.1% on a weekly basis; and 4.1% on a less than a weekly basis (see Table 1, more details in Appendix 3).

The social media platform most commonly used by the population of Wales was Facebook, with half (50.6%) reporting using it on a daily basis (including 23.4% who reported using it several times a day); followed by 39.4% using WhatsApp (including 17.6% who reported using it several times a day), and 24.4% using YouTube (including 9.9% who reported using it several times a day). Only 11.1% used Twitter on a daily basis (including 4.0% who reported using it several times a day).

Table 1. Proportion of those using different social media platforms by the population of Wales, amongst the population sampled, and when limited to those with internet access

	Weighted[i] to Welsh population (%)				Within population sampled (n=1,240) (%)				People with internet access only (n=1,059) (%)			
	Daily	Weekly	<Weekly	No use[ii]	Daily	Weekly	<Weekly	No use[ii]	Daily	Weekly	<Weekly	No use[ii]
At least one platform	64.7	8.1	4.1	9.3	63.5	8.1	4.1	9.7	74.4	9.4	4.8	11.3
Facebook	50.6	8.4	3.2	23.9	49.6	8.5	3.2	24.1	58.1	9.9	3.8	28.3
WhatsApp	39.4	10.9	4.8	31.2	39.3	10.6	4.8	30.8	46.0	12.4	5.6	36.0
YouTube	24.4	19.0	17.0	25.7	22.3	18.9	17.1	27.1	26.2	22.1	20.0	31.7
Instagram	18.7	6.1	6.0	55.4	17.0	5.9	6.0	56.5	19.9	6.9	7.1	66.1
Snapchat	15.2	4.2	4.2	62.6	13.5	3.9	4.4	63.7	15.8	4.5	5.1	74.6
Twitter	11.1	5.1	7.8	62.2	10.5	5.0	7.5	62.4	12.2	5.9	8.8	73.1
LinkedIn	3.2	4.0	7.2	71.7	3.2	3.8	6.9	71.5	3.6	4.4	8.1	83.7
Twitch	1.3	1.2	2.3	81.0	1.0	0.8	2.0	81.2	1.2	0.9	2.4	95.1

[i]Using mid-2015 population estimates LSOAs by sex, age group (ONS, 2016) and deprivation quintile (WIMD; Welsh Government, 2015).

[ii]Does include people who either did not know what the social media platform was or never used it but does not include people without internet access to use social media.

Within the population sampled

Within the population sampled, Facebook was the most frequently used social media platform followed by WhatsApp, and Twitch was the least frequently used one.

After limiting to only people with internet access, the proportion reported using one or more form of social media on a daily basis increased from 63.5% to 74.4%. Daily usage of Facebook increased from 49.6% to 58.1% and WhatsApp increased from 39.3% to 46.0% (see Table 1; and Appendix 3).

3.1.2 Differences in types of social media platforms by user category

Within the Welsh population

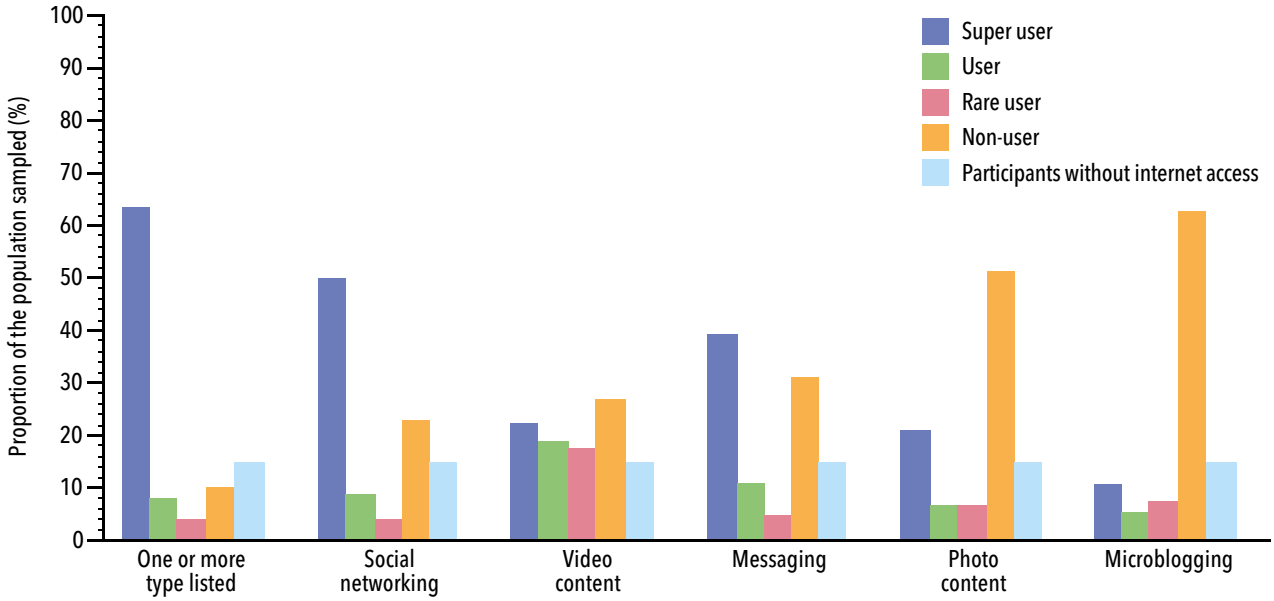
Within the Welsh population, 51.0% were super users (see Box 4) on social networking platforms (Facebook and/or LinkedIn; see Appendix 2), 39.4% were super users on messaging (WhatsApp), around a quarter were super users on video content (YouTube and/or Twitch; 24.6%), and photo content platforms (Instagram and/or Snapchat; 23.0%). The least popular platform type was microblogging (Twitter) with only 11.1% categorised as super users.

Within the population sampled

The highest level of activity reported amongst super users was on social networking (Facebook and/or LinkedIn) and messaging (WhatsApp) platforms (see Figure 1). Microblogging (Twitter) had the highest proportion of non-users among all social media platform types.

After limiting to only people with internet access (n=1,059), the proportions of super users increased from 50.2% to 58.7% on social networking, and from 39.4% to 46.1% on messaging platforms.

Figure 1. Proportions of the population sampled who reported frequency of use for each type of social media platform.



3.2. Are there differences in the use of social media platform types and by population groups in Wales?

Key messages:

- **A higher proportion of women used social networking, photo content and messaging types of social media platforms.**
- **Lower proportions with increasing age were found for using each type of social media platform with the exception of messaging.**
- **Almost all (99.6%) 16-29 year olds with internet access were on social media. Moreover, 75.6% of those aged 60-69 years and 59.8% of those aged 70+ years had used one or more type of social media platforms.**
- **For social networking, video- or photo-content social media platforms, frequency of use was similar across deprivation groups, but a lower proportion of those living in most deprived areas reported using microblogging and messaging platforms.**

3.2.1 Differences by socio-demographic characteristics

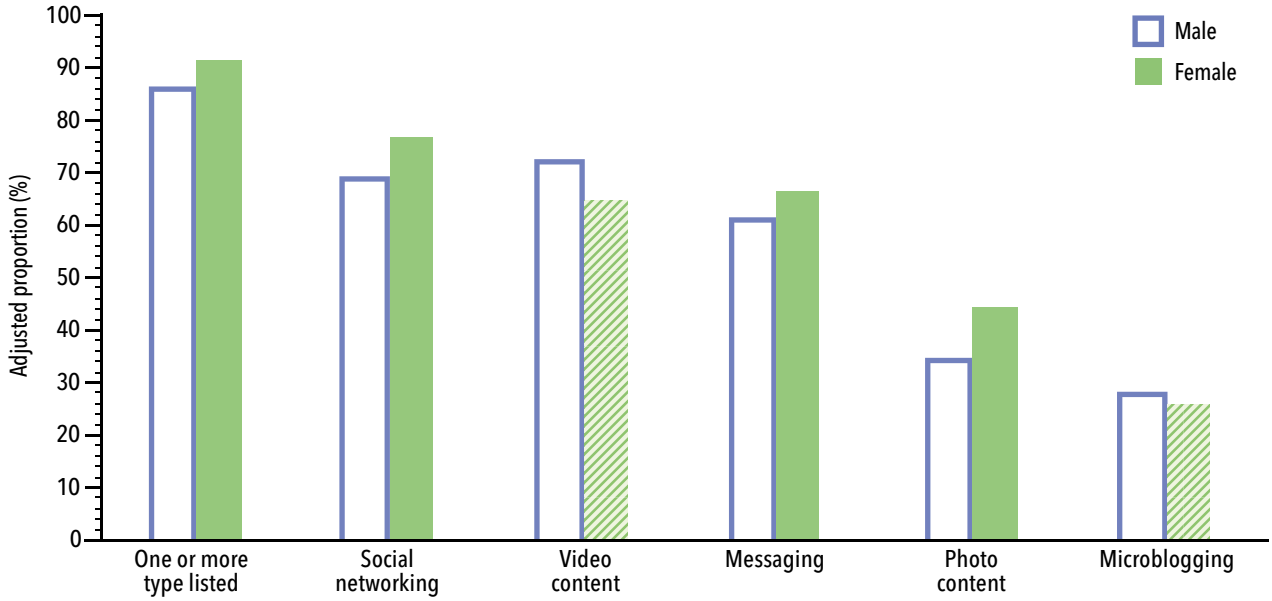
Limiting to only people with internet access (n=1,059), differences in the use[b] of social media by gender, age group and deprivation quintile were explored (see Appendix 4).

By gender

A higher proportion of women than men reported using one or more type of social media platforms (91.2% and 85.7%, respectively, p=0.002, see Figure 2). Significant differences were found between the genders for three out of five types of social media platforms. Women were more likely than men to engage with social networking (76.9% and 68.7%, respectively, p=0.001), photo content (44.9% and 34.0%, respectively, p<0.001), and messaging (66.7% and 60.9%, respectively, p=0.03) platforms.

[b] To define 'use' as a binary outcome variable in this section, participants were grouped into either using (i.e. being super users, users and rare users) one or more social media platforms types or not.

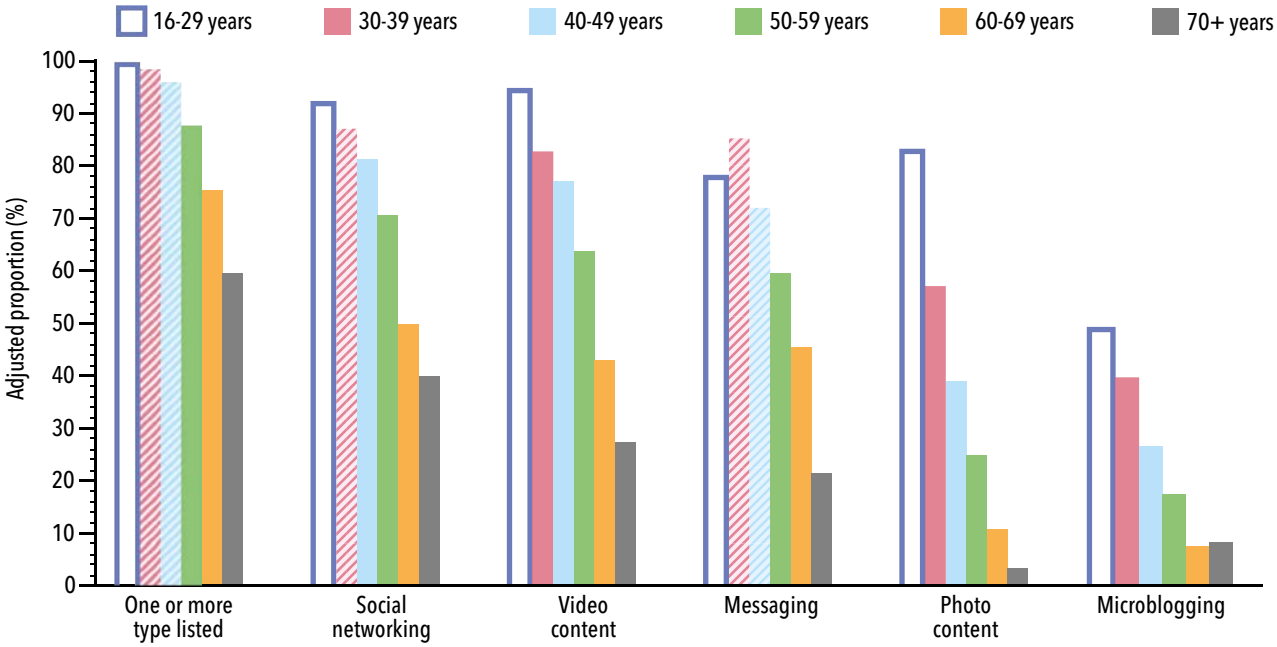
Figure 2. Adjusted proportion of people with internet access who engage with different social media platforms by gender (solid bars represent a statistically significant difference to the reference category male [unfilled bars]; patterned bars represent a non-significant difference [Appendix 4]).



By age group

The proportion using any type of social media platform decreased with increasing age, from 99.6% amongst 16-29 year olds to 88.1% amongst 50-59 year olds ($p<0.001$), to 75.6% amongst 60-69 year olds ($p<0.001$), and to 59.8% amongst 70+ year olds ($p<0.001$; see Figure 3). Lower proportions with increasing age were found for using each type of social media platform with the exception of messaging, despite some of the differences were not statistically significant.

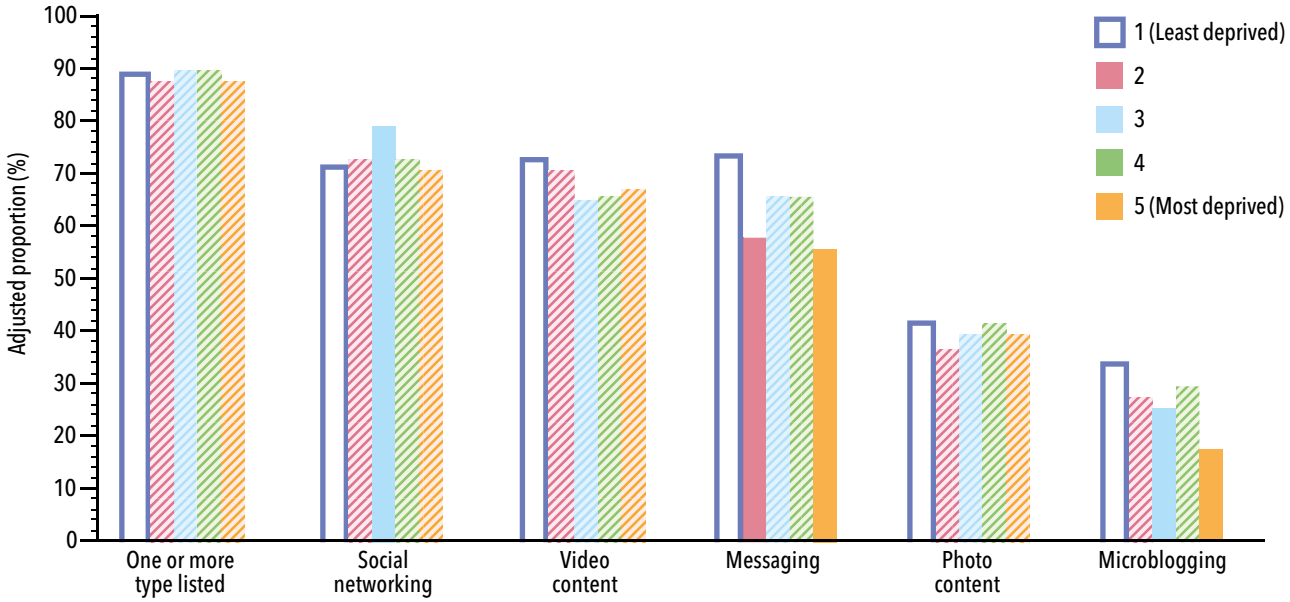
Figure 3. Adjusted proportion of people with internet access who engage with different social media platforms by age groups (solid bars represent a statistically significant difference to the reference category 16-29 years old [unfilled bars]; patterned bars represent a non-significant difference [Appendix 4]).



By deprivation quintile

Across deprivation quintiles, similar proportions of people used one or more type of social media platforms; no statistically significant differences were found (see Figure 4). However, when considered within each social media platform type, compared to those living in the least deprived, a lower proportion of those living in the most deprived area reported using a microblogging platform (33.5% least deprived, 17.5% most deprived, $p<0.001$) and a messaging platform (73.7% least deprived, 55.7% most deprived, $p<0.001$). Similar proportions of people used video content and photo content platforms across deprivation quintiles, and the differences were not statistically significant.

Figure 4. Adjusted proportion of people with internet access who engage with different social media platforms by deprivation quintile (solid bars represent a statistically significant difference to the reference category deprivation quintile 1 [least deprived; unfilled bars]; patterned bars represent a non-significant difference [Appendix 4]).



3.2.2 Differences by health status

Key messages:

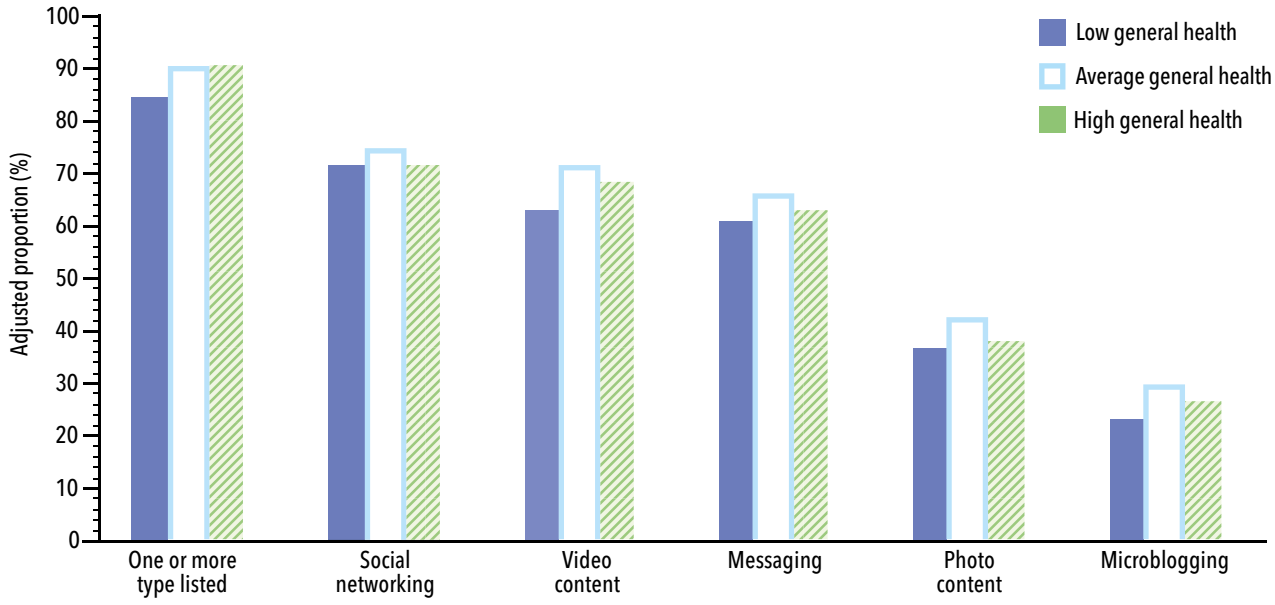
- **A lower proportion (84.8%) of those with low self-reported general health used one or more type of social media platforms, compared to those who reported average general health (89.9%).**
- **Similar usage were found between average and low mental wellbeing for all social media types.**
- **A lower proportion (84.2%) of those with 2-3 HHBs reported using one or more type of social media platforms, compared to those with 0 HHB reported (91.2%).**

Limiting to only the people with internet access (n=1,059), differences in the use of social media by self-reported general health, mental wellbeing, and HHBs were explored (see Appendix 4). Definitions of each category within health status related variables can be found in Box 6.

By general health

Amongst those who had access to the internet, the proportion of using one or more social media platform was lower amongst those with low general health, compared to those who reported average general health (84.8% compared to 89.9%, respectively, p=0.018; see Figure 5). A similar pattern was found for video content platforms with 63.2% of those with low general health compared to 71.3% with average general health, p=0.009). Similar proportions were found between average and high general health for all types of social media and the differences were not statistically significant.

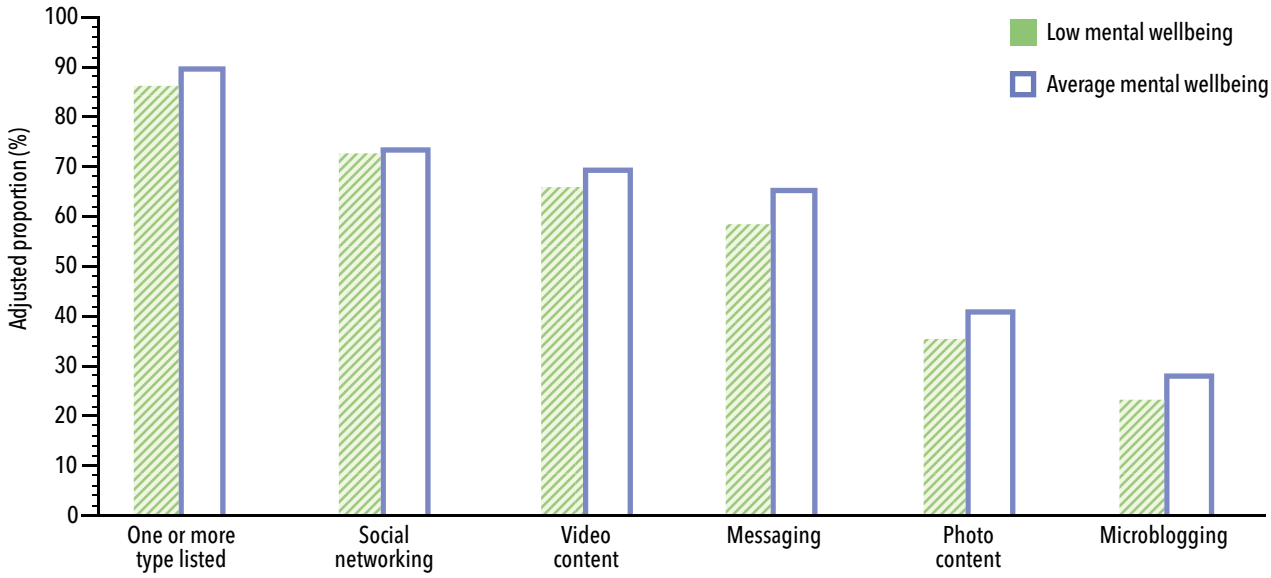
Figure 5. Adjusted proportion of people with internet access who engage with different social media platforms by self-reported general health (solid bars represent a statistically significant difference to the reference category self-reported average general health [unfilled bars]; patterned bars represent a non-significant difference [Appendix 4]).



By mental wellbeing

Amongst those with access to the internet only, 86.1% of those with low mental wellbeing used one or more type of social media platforms, and this increased slightly, but not significantly, to 89.3% amongst those with average mental wellbeing (see Figure 6). The same pattern was evident across the five social media platform types.

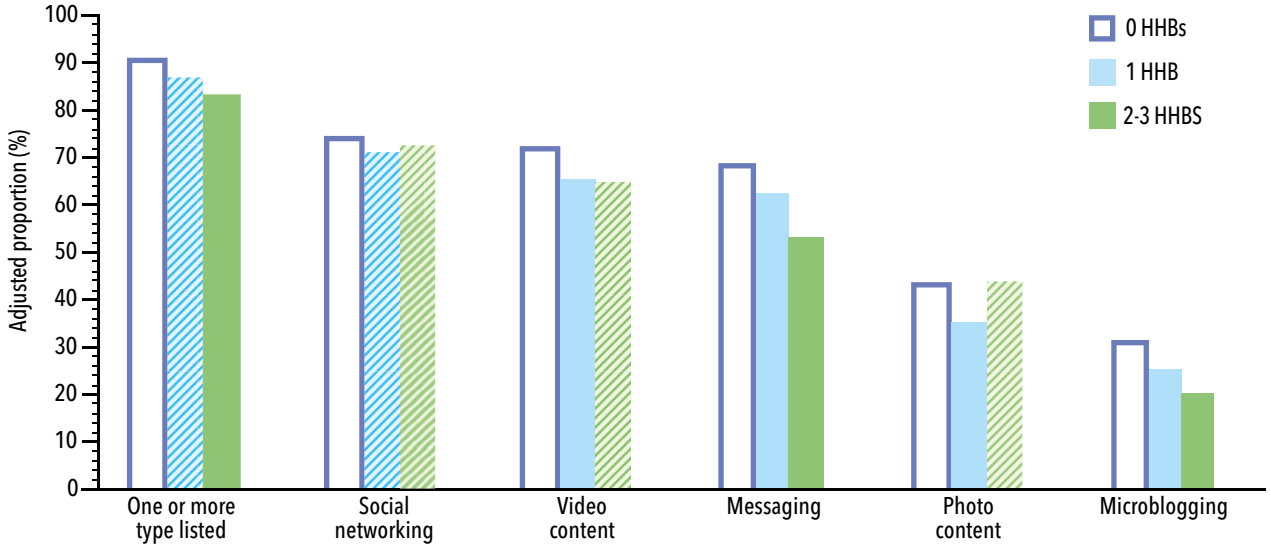
Figure 6. Adjusted proportion of people with internet access who engage with different social media platforms by mental wellbeing (solid bars represent a statistically significant difference to the reference category average mental wellbeing [unfilled bars]; patterned bars represent a non-significant difference [Appendix 4]).



By health-harming behaviours (HHBs)

Compared to people reported 0 HHB, a lower proportion of people with 2-3 HHBs reported using one or more type of social media platform (84.2%, compared to 0 HHB 91.2%, p=0.011; see Figure 7). Same pattern was observed for messaging (53.4% and 68.7%, p<0.001) and microblogging (20.4% and 31.0%, p=0.008). A lower proportion of those with 1 HHB reported using video content (65.6% compared to 72.5%, p=0.013), photo content (35.3% compared to 43.1%, p=0.004) and microblogging (25.2% compared to 31.0%, p=0.042) platforms.

Figure 7. Adjusted proportion of people with internet access who engage with different social media platform by HHBs (solid bars represent a statistically significant difference to the reference category 0 HHB [unfilled bars]; patterned bars represent a non-significant difference [Appendix 4]).



3.3. Are there differences in social media user categories by population groups in Wales?

A user category[c] was assigned to each participant. The category was based on their highest frequency of use across any social media platform. The four categories were super user, user, rare user and non-user (see Box 4 for definitions). In this section, we report the differences in the user categories by gender, age group, deprivation quintile and health status (see Appendix 5).

3.3.1 Differences by socio-demographic characteristics

Key messages:

- **A higher proportion of women were super users compared to men.**
- **Whilst the proportion of super users declined with age, around half of those aged 60-69 years, and a third of those aged 70+ years were super users on one or more social media platform.**
- **Proportions of use were similar across deprivation quintiles for any user categories.**

By gender

A higher proportion of women were super users compared to men (76.7% and 71.8%, respectively, p=0.040), while a higher proportion of men were non-users compared to women (14.3% and 8.8%, respectively, p=0.002).

By age group

The proportion of super users decreased with increasing age from 96.2% amongst 16-29 year olds to 82.1% amongst 40-49 year olds (p<0.001), 67.3% amongst 50-59 year olds (p<0.001), 53.8% amongst 60-69 year olds (p<0.001), and 31.3% amongst 70+ year olds (p<0.001). The proportion of rare users and non-users increased with increasing age.

By deprivation quintile

For any user category, the proportions of people who used social media platforms were similar regardless of deprivation quintiles. The differences were not statistically significant.

[c] User category of each participant (super user, user, rare user and non-user) in this section was derived from the highest frequency of using any type of social media platform.

3.3.2 Differences by health status

Key messages:

- **A higher proportion of people with low general health were non-users compared to people with average general health; however, the majority for both were super users.**
- **For any user categories, proportions of people used social media were similar regardless of whether they reported average or low mental wellbeing.**
- **Proportions of people used social media were similar across numbers of HHBs in any user category, except non-users. A higher proportion of people who reported 2-3 HHBs were non-users compared to those who reported 0 HHB.**

By general health

Whilst the majority of people with low general health and average general health were super users of social media platforms (71.3% and 76.9%), a higher proportion of people with high general health were users compared to people with average general health (12.0% and 7.3%, p=0.030). Moreover, a higher proportion of people with low general health were non-users compared to people with average general health (15.2% and 10.1%, respectively, p=0.018).

By mental wellbeing

For all user categories, proportions of people used social media were similar regardless of whether they reported average or low mental wellbeing; super users were found amongst 70.0% of people who reported low mental wellbeing and 75.4% of people who reported average mental wellbeing. The differences were not statistically significant.

By health-harming behaviours (HHBs)

With the exception of non-users, proportions of people who used social media regardless of the number of reported health-harming behaviours were similar across all user categories. The differences in proportions were not statistically significant. A higher proportion of those with 2-3 HHBs were non-users (15.8% compared to 8.8% with 0 HHB, p=0.011).

3.4. Are there differences in people who shared personal health information on social media platforms?

People were asked about their perception of sharing personal health information on social media platforms to their friends and family, and/or to people they do not know (see Box 5 and Appendix 6).

Limiting to only people with internet access (n=1,059), only 102 (9.6%) shared personal details about their health on social media platforms. Of those who shared their health information, the majority (73.5%) shared with friends and family only and the remaining (26.5%) shared with both parties (including ffriends and family, and people they did not know) (see Figure 8). Of those who shared their health information, 37.3% worried about the privacy of their health information and the remaining (62.7%) did not. The proportion of those who were concerned about their privacy was similar for people who shared with friends and family only, and those who shared with both parties. Analyses to explore differences across socioeconomic and health status were not performed due to small numbers.

Figure 8. Proportion sharing personal health information on social media platforms

4. Discussion

Social media has the potential to be an important tool for public health, with an increasing proportion of the population communicating through social networks online[16]. This is the second report on *Population health in a digital age,* from the nationally representative survey for Wales examining levels of engagement with digital technology to support health, and differences across population groups and health status. The findings presented here provide an overview of variations in social media use across the population in Wales.

• Engagement with social media

In our survey, more than three quarters of Welsh residents (aged 16+ years) reported using one or more social media platform, the majority (65%) engaging on a daily basis. The most frequently used social media platforms were Facebook (51%), followed by WhatsApp (39%), and YouTube (24%), while only 11% used Twitter. These findings are comparable to other UK surveys, which reported that 70% of individuals aged 16+ years have a social media profile[7], and the most popular platform was Facebook, with growth (from 2015 to 2018) in the proportion using WhatsApp, YouTube, and Instagram[7,17].

A proportion of those who do not engage with social media, do not have access to the internet. Previously reported findings from this survey highlighted that 13% of the population in Wales did not have access to the internet at home[2], a figure comparable to the National Survey for Wales (2017-18) which reported that 15% of adults do not regularly use the internet in Wales[18]. Inequalities in internet access are evident with those of older age, living with disability, having no qualifications or those economically inactive less likely to be online[18], alongside those in poorer health[2]. These digital inequalities need to be taken into account when considering the benefits and limitations of internet-enabled technologies to support health. Welsh Government is committed to addressing digital inclusion, connectivity, and barriers to engagement including digital skills and motivation, whilst encouraging the public sector, in particular health, to communicate through social media[19,20].

• Differences in engagement with social media platforms across population groups

In our survey, 89% of the population sampled *who have access to the internet* reported using one or more social media platform on a daily basis, and the use of social media was higher in women than men (91% compared to 86%, respectively), and decreased with increasing age (from ≈100% in the 16-29 years to 76% in those aged 60-69 years and 60% in those aged 70 years or older). These patterns were evident across all types of social media platforms, with two exceptions; we found no gender difference in microblogging (e.g. Twitter), and no differences by age group in messaging (e.g. WhatsApp). The gender and age patterns in Wales are comparable to other UK studies which have reported higher use of social media in women, and lower use with increasing age[7,17]. Social media is often considered within the context of younger populations, whereas these findings have highlighted that a high proportion of those in the older age groups do engage with social media.

In this study we were able to explore age, gender and deprivation related differences by social media platform, and found that the different platforms reach different audiences. For example, a higher proportion of women used social networking, photo content and messaging social media platforms, whereas a higher proportion of men used video content platforms, and there was no gender difference in microblogging (e.g. Twitter). Across all the age groups, social networking platforms were the most frequently reported type of social media used, and whilst the use of each

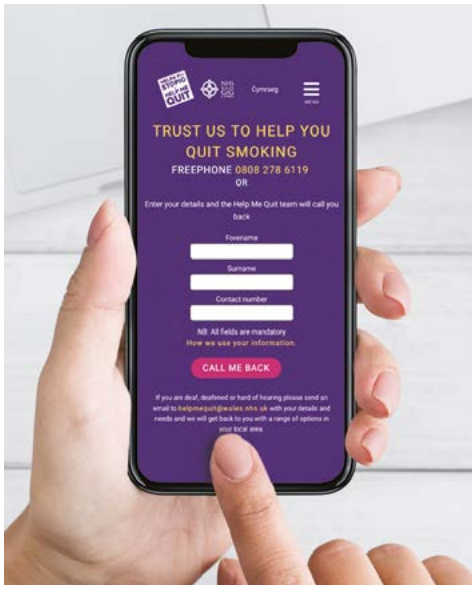
type of social media platforms decreased with age, this was not true for messaging platforms (e.g. WhatsApp). **Health communication should take into consideration these differences in use of social media platforms across population groups, for example the potential to use video content to target men on health and wellbeing, or social networking sites to span across age groups.**

Other national surveys have shown that the most deprived groups are less likely to have a social media profile[7], but have not considered whether that difference is primarily due to internet access. Interestingly, taking internet access into consideration in this survey, there was no overall difference in social media use by deprivation group in Wales after excluding those without access to the internet; but there was a difference by type of social media platform, with significantly lower levels of engagement with microblogging and messaging in those least affluent. **The potential for social media to reach more deprived populations has been reported in the USA[12], and whilst the findings in this survey do support that finding, we have also shown it is important to consider the type of platform.**

Whilst this survey did not ask if people were engaging with social media for health content, we know from other studies that people are increasingly using online resources to support health[2]. An understanding of underlying differences in groups of people who engage with social media, irrespective of the topic, is important when considering which groups might be reached through using social media as an additional communication channel for health.

To realise the potential of social media for health in a digital age will require continued efforts to address underlying e-health literacy, to develop and deliver messaging informed by behavioural insights suited to each platform[21], and to address the increasing likelihood that people are shielding themselves on social media from opinions and views which differ from their own[7]. **At present, health systems largely use social media as another channel to share information, but this approach does not capitalise on the reason social media works - the social networking element[22]. Health systems need to engage in conversations to support high attentiveness and appeal with their audiences; to deliver effective health behaviour change addressing beliefs, attitudes, intentions and behaviour, as well as just improving knowledge and awareness.**

• Social media use by health status



Our study also found 65% of the Welsh population were super users of social media, irrespective of levels of self-reported general health and mental wellbeing. Many studies have explored how social media offers people the opportunity to communicate and interact with others and find and receive information about health conditions[5]. Moving beyond static health promotion apps, social networking sites enables users to interact with a community with similar conditions to provide and receive support. For example, a USA based study on Facebook posts specific to diabetes management found a community of support, pointing to specialized knowledge, and sharing experiences of living with diabetes[23]. In contrast, the peer support is not always limited to a health condition, for example, a small study of chronically ill teenage patients in the USA found that social media played an important role in enabling them to be "regular" teenagers, rather than as a way to find individuals with a similar condition/ find more information about their diagnosis[24]. **There needs to be further exploration of the potential benefits of social media to support health and wellbeing, alongside identifying and protecting against the potential harms.** For example, there are raised concerns about the credibility and validity of information online especially in support groups being misleading[9] or presented alongside promotional activity/adverts[23,25]. Empowering individuals to make evidence-based informed decisions based on reliable information online extends beyond health.

- **Sharing health-related content through social media**

UK studies have reported that 78% of adult users post comments, videos or photos online[16]. The reported benefits include a way to connect with others, but there are also risks due to the misuse of this personal information by organisations and individuals, which may cause harm to the individual[23]. Our study found approximately one in ten individuals aged 16+ years who have access to the internet, share personal health information on social media platforms. Of those who do, nearly 30% share information with people they do not know. Despite this, more than a third stated they are concerned about their privacy – irrespective of sharing with friends or strangers.

An individual's ability to retain control over their own content is important, as demonstrated by 62% of people who have ever untagged themselves from someone else's photo or video of themselves[17]. The mechanisms needed to protect privacy are complex[26] but findings from another UK study suggest that awareness of privacy issues has increased over the past few years, and participants are using tools available to them to manage these concerns, including privacy settings, using multiple email addresses, and in some cases providing false information to companies to avoid receiving spam calls or emails[16].

- **Implications: The value of social media unstructured data to public health**

There is increasing interest in the potential value of user-generated content to support public health for example, from complementing health surveillance systems in particular for infectious diseases such as norovirus and influenza[27,28]; identifying populations with specific health needs or risks through sentiment analysis[29]; as a multilingual communication channel during large outbreaks or emergency events[30]; or better understanding the behavioural determinants of health-harming actions and interventions. However, there are many limitations including the validity of data, ethics of capture, and as demonstrated by this report, underlying social differences in access and engagement with the internet and social media, which need to be taken into account.

Our study has demonstrated that social media is not only a platform for younger generation and can reach across deprivation groups. Findings also highlighted important differences in the use of different social media platforms across age, gender and deprivation groups. There remains much to learn about the role of social media in health, both beneficial and harmful but understanding that variation in access to technology, education, and broader socio-political context remains important. With an increasing use of public services to move towards digital channels, we need to continue efforts to address inequalities in access, but recognise that social media may offer a platform to reach a wider audience and engage differently with populations about health.

5. References

1. World Bank. *World Development Report 2016: Digital Dividends.* Washington, DC: World Bank; 2016.
2. Davies AR, Sharp CA, Homolova L, Bellis MA. Population health in a digital age. The use of digital technology to support and monitor health in Wales. Cardiff; 2019.
3. Kaplan AM, Haenlein M. Users of the world, unite! The challenges and opportunities of Social Media. Bus Horiz. 2010;53(1):59–68.
4. Hootsuite™. The global state of digital in 2019. 2019. Available from: https://hootsuite.com/resources/digital-in-2019 [Accessed 05/11/2019].
5. Moorhead SA, Hazlett DE, Harrison L, Carroll JK, Irwin A, Hoving C. A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication. J Med Internet Res [Internet]. 2013;15(4):e85. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3636326/ [Accessed 03/08/2019].
6. Hawker MD. Social networking in the national health service in England: A quantitative analysis of the online identities of 152 primary care trusts. Stud Health Technol Inform. 2010;160(PART 1):356–60.
7. Ofcom. Adults' media use and attitudes report [Internet]. London; 2019. Available from: https://www.ofcom.org.uk/__data/assets/pdf_file/0021/149124/adults-media-use-and-attitudes-report.pdf [Accessed 07/11/2019].
8. Sharp CA, Hughes K, Bellis MA. Stay Well in Wales: The public's views on public health representative household survey. Cardiff; 2017.
9. Cordoş A-A, Bolboacă S, Drugan C. Social Media Usage for Patients and Healthcare Consumers: A Literature Review. Publications [Internet]. 2017;5(2):9. Available from: http://www.mdpi.com/2304-6775/5/2/9 [Accessed 05/11/2019].
10. McNab C. What social media offers to health professionals and citizens. Bull World Health Organ. 2009;87(8):566.
11. Fernandez-Luque L, Elahi N, Grajales FJ. An analysis of personal medical information disclosed in youtube videos created by patients with multiple sclerosis. Stud Health Technol Inform. 2009;150:292–6.
12. Kontos E, Emmons K, Puleo E, Viswanath K. Communication inequalities and public health implications of adult social networking site use in the United States. J Health Commun. 2011;15(Suppl 3):216–35.
13. Ramo D, Rodriguez T, Chaves K, Sommer M, Prochaska J. Facebook Recruitment of Young Adult Smokers for a Cessation Trial: Methods, Metrics, and Lessons Learned. Internet Interv. 2014;1(2):58–64.
14. Boston Public Health Commission. Social Media Platforms. 2013. Retrieved from https://delvalle.bphc.org/mod/wiki/view.php?pageid=65 [Accessed 05/11/2019].
15. O'Neill B, Ziebland S, Valderas J, Lupiáñez-Villanueva F. User-generated online health content: A survey of internet users in the United Kingdom. J Med Internet Res. 2014;16(4):1–11.
16. Ofcom. Adults' media use and attitudes report 2017. 2017;(April):1–169. Available from: https://www.ofcom.org.uk/__data/assets/pdf_file/0020/102755/adults-media-use-attitudes-2017.pdf [Accessed 02/08/2019].
17. Ofcom. United Kingdom's Communications Market Report [Internet]. Communications Market Report. London; 2017. Available from: https://www.ofcom.org.uk/__data/assets/pdf_file/0017/105074/cmr-2017-uk.pdf [Accessed 02/08/2019].
18. Welsh Government. National Survey for Wales, 2017-18 Internet use and digital skills. 2018.
19. Welsh Government. Delivering Digital Inclusion : A Strategic Framework for Wales [Internet]. Cardiff; 2016. Available from: https://gov.wales/docs/dsjlg/publications/comm/160316-digital-inclusion-strategic-framework-en.pdf [Accessed 05/10/2019].
20. Welsh Government. Improving people's lives through digital technologies [Internet]. Cardiff; 2018. Available from: https://www.digitalcommunities.gov.wales/report-improving-peoples-lives-through-digital-technologies-welsh-government-2018/ [Accessed 05/10/2019].
21. Norman C. Social media and health promotion. Glob Health Promot. 2012;19(4):3–6.
22. Neiger BL, Thackeray R, Burton SH, Giraud-Carrier CG, Fagen MC. Evaluating Social Media's Capacity to Develop Engaged Audiences in Health Promotion Settings: Use of Twitter Metrics as a Case Study. Health Promot Pract. 2013;14(2):157–62.
23. Greene JA, Choudhry NK, Kilabuk E, Shrank WH. Online social networking by patients with diabetes: A qualitative evaluation of communication with Facebook. J Gen Intern Med. 2010;26(3):287–92.
24. van der Velden M, El Emam K. "Not all my friends need to know": A qualitative study of teenage patients, privacy, and social media. J Am Med Informatics Assoc. 2013;20(1):16–24.
25. Fergie G, Hilton S, Hunt K. Young adults' experiences of seeking online information about diabetes and mental health in the age of social media. Heal Expect. 2016;19(6):1324–35.
26. Bansal G, Zahedi FM, Gefen D. The impact of personal dispositions on information sensitivity, privacy concern and trust in disclosing health information online. Decis Support Syst. 2010;49(2):138–50.
27. Carter M. How Twitter may have helped Nigeria contain Ebola. BMJ. 2014;349(November):1–2.
28. Wagner M, Lampos V, Cox IJ, Pebody R. The added value of online user-generated content in traditional methods for influenza surveillance. Sci Rep. 2018;8(1):1–9.
29. Gruebner O, Sykora M, Lowe SR, Shankardass K, Trinquart L, Jackson T, et al. Mental health surveillance after the terrorist attacks in Paris. Lancet. 2016;387(10034):2195–6.
30. Hagen L, Keller T, Neely S, DePaula N, Robert-Cooperman C. Crisis Communications in the Age of Social Media: A Network Analysis of Zika-Related Tweets. Soc Sci Comput Rev. 2018;36(5):523–41.

6. Appendices

Appendix 1. Methods and population demographics

Between April and June 2018, a cross-sectional survey of residents in Wales was conducted by Public Health Wales and Bangor University's Public Health Collaborating Unit. The fieldwork was carried out by BMG Research, a professional market research company. All interviewers followed the Market Research Society (MRS) Code of Conduct. On completion of the interview, individuals were provided with a thank you leaflet.

NHS Research permissions were gained from the Public Health Wales Research and Development Office and ethical approval was granted by Bangor University Healthcare and Medical Sciences Academic Ethics Committee.

Sample

Residents of Wales aged 16 years or over were recruited to complete a household survey (one person per household) using a stratified random probability sampling framework based on Lower Super Output Areas (LSOA)[d], Welsh Index of Multiple Deprivation (WIMD)[e], local health boards and rurality[f].

To allow adequate representation of residents of Wales by relevant characteristics (e.g. age, gender and deprivation), a target sample size of 1,250 individuals was set.

Participation rate

A total of 3,870 households were informed through a bilingual letter inviting them to voluntarily participate or to opt out of the study; 6.5% of households opted out at this stage. Of the eligible households visited by interviewers, there was a response in 46.5% households (someone answered, n=1,801). Of those households where there was a response 1,252 face-to-face interviews were completed (compliance rate of 69.5%). The most common reasons for declining to participate was 'no reason given' or the 'individual had no time'.

Interviews were conducted at the participant's house using a questionnaire delivered by professionally trained interviewers using Computer Assisted Personal Interviewing (CAPI), in English (98.3% of interviews), Welsh (1.0%) or other languages (0.7%). A total of 181 questionnaires (14.6%) were short questionnaires, completed by those who never accessed the internet at home, work or elsewhere on a phone, tablet, computer or voice controlled personal assistant, and never use wearable technology.

The population surveyed was representative of the general population of Wales across deprivation quintiles and rurality, but included a slightly higher proportion of women and those aged 30-49 years (Table A1). The majority of those surveyed were of white ethnicity (95.8%). Given the high proportion of white ethnicity and small sample size, population weighted estimates and adjusted proportions were adjusted for age, gender and deprivation.

[d] Office for National Statistics (2017). Mid-2016 Population Estimates for Lower Layer Super Output Areas in England and Wales. Available at: https://www.nomisweb.co.uk/ accessed on 13 December 2018.

[e] NHS Wales Informatics Service (2014) Deprivation Quintile (Overall), WIMD, LSOA (Census 2011 based) Available at: https://www.healthmapswales.wales.nhs.uk/IAS/metadata/view/indicatorinstance?pid=11326&id=543060&norefer=true

[f] NHS Wales Informatics Service (2011) Rural Urban Classification, Classification, LSOA Available at: https://www.healthmapswales.wales.nhs.uk/IAS/metadata/view/indicatorinstance?pid=10389&id=539170&norefer=true

Table A1. Demographics of sample compared to ONS mid year (2016) Welsh population estimates

		Sample (N = 1,252)		Population (ONS 2016)		X_2
		n	%	n	%	*p*
Gender	Men	575	45.9%	1,248,369	48.8%	0.039
	Women	677	54.1%	1,307,702	51.2%	
Age group (years)	16-29	198	16.0%	560,563	21.9%	<0.001
	30-39	222	17.9%	358,010	14.0%	
	40-49	195	15.7%	394,276	15.4%	
	50-59	205	16.5%	423,797	16.6%	
	60-69	181	14.6%	382,233	15.0%	
	70+	239	19.3%	437,192	17.1%	
	No data	*12*				
Deprivation quintile	1 (Least deprived)	259	20.7%	476,309	18.6%	0.930
	2	252	20.1%	504,420	19.7%	
	3	253	20.2%	533,482	20.9%	
	4	254	20.3%	528,384	20.7%	
	5 (Most deprived)	234	18.7%	513,476	20.1%	

Population data obtained from Office for National Statistics: Mid-2016 Population Estimates for Wales. Available at: https://www.nomisweb.co.uk/. [Accessed on 13/12/2018]

Questionnaire

The questionnaire content was developed drawing on questions about digital technology, internet use, health status and socio-demographics from validated sources where possible or developed by the research team drawing on themes from the literature (Table A2). The questionnaire was piloted internally by the research team and externally by the BMG Research prior to implementation.

In order to determine if the participant has internet access, questions in Box A1 were asked in order to classify each participant as either "with internet access" or "without internet access".

Socio-demographic measures

Area level deprivation quintiles were assigned by mapping individual postcodes to the mid-year 2014 ONS lower super output area deprivation quintiles[g]. Geographical classifications of rurality were assigned at a household level based on LSOA[h].

Data analysis

Data analysis were undertaken using R version 3.5.3.

[g] NHS Wales Informatics Service (2014) Deprivation Quintile (Overall), WIMD, LSOA (Census 2011 based) Available at: https://www.healthmapswales.wales.nhs.uk/IAS/metadata/view/indicatorinstance?pid=11326&id=543060&norefer=true

[h] NHS Wales Informatics Service (2011) Rural Urban Classification, Classification, LSOA Available at: https://www.healthmapswales.wales.nhs.uk/IAS/metadata/view/indicatorinstance?pid=10389&id=539170&norefer=true

Table A2. Topics included in the questionnaire

Topics		Source
Access to the internet and technology	Type of mobile phone used	n/a
	Access to the internet at home	National Survey Wales[i]
	At home, how do you connect to the internet?	National Survey Wales[i]
	How often do you access the internet, whether at home, work or elsewhere?	National Survey Wales[i]
	Use of wearable technology	n/a
Use of technology	Technology addiction	Adapted from the Bergen Facebook Addiction Scale[ii]
	Ability to use technology to perform health supporting tasks	Adapted from the Digital Skills framework (The Get Digital)[iii]
	Use of social media	*List of actions and activites informed by literature review on common themes, and Ofcom Technology Tracker (2017)*[iv] *and Teens, Health and Technology National Survey (2016)*[v].
	Use of technology in employment	
Health status	Self-reported health status	EQ-5D[vi]
	Mental health status	Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS)[vii]
	Presence of long-term health condition or illness Impact of health condition or illness on activities of daily living	National Survey for Wales[i]
	Smoking tobacco	National Survey for Wales[i]
	E-cigarettes use	National Survey for Wales[i]
	Alcohol consumption	AUDIT C[viii]
	Physical activity participation	Scottish Physical Activity Screening Questionnaire[ix]

[i]National Survey for Wales 2017-18 Available at: https://gov.wales/national-survey-wales
[ii]Andreassen CS *et al (2012). Development of a Facebook Addicition Scale*. Psychological Reports. Vol 110, 501-517. Available at: https://doi.org/10.2466/02.09.18.PR0.110.2.501-517
[iii]The Get Digital (2015) Available at: https://www.thetechpartnership.com/basic-digital-skills/basic-digital-skills-framework/
[iv]OFcom Technology Tracker. Available at: https://www.ofcom.org.uk/research-and-data/multi-sector-research/cmr/cmr-2017/interactive/technology-tracker
[v]Wartella E *et al* (2016) Teens, Health and Technology: A National Survey. Media and Communication. vol 4, 13-23. Available at: www.cogitatiopress.com/mediaandcommunication/article/view/515/515
[vi]Available at: https://euroqol.org/
[vii]Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS) © NHS Health Scotland, University of Warwick and University of Edinburgh, 2008, all rights reserved https://warwick.ac.uk/fac/med/research/platform/wemwbs/swemwbs_7_item.pdf.
[viii]AUDIT-C tool. Available at: https://www.integration.samhsa.gov/images/res/tool_auditc.pdf
[ix]Scottish Physical Activity Screening Questionnaire http://www.paha.org.uk/Resource/scottish-physical-activity-screening-question-scot-pasq;

Box A1. Single questions asked to obtain information on access to the internet and/or digital technology

Outcomes	Question	Categories (Responses)
Access to the internet	Do you have a mobile phone?[i]	Yes, No
	Do you have access to the internet at home?[i]	Yes, No
Access to technology	How often do you access the internet, whether at home, work or elsewhere[i] by • mobile phone? • desktop computer/laptop? • tablet computer? • voice controlled personal assistant?	Often (several times a day, daily, weekly) Never (less than weekly, never)
	How often do you use wearable technology such as Fitbit®, Garmin, Apple Watch®, to track your health behaviours?	Often (5-7 days a week, 2-4 days a week, 1 day a week/weekly), Never (less than weekly, never)

[i] Adapted from the National Survey for Wales https://gov.wales/national-survey-wales

Appendix 2. Social media platform engagement

Table A3. Social media platform and frequency of use

Values are unadjusted percentages within the population sampled (N=1,240) and unadjusted percentages weighted on the demographic distribution of the Welsh population[i].

		Several times a day	Daily	Weekly	Less than weekly	Never	Don't know what it is	Refused	People without internet access
Facebook	n	286	329	105	40	295	4	0	181
	% Population sampled	23.1	26.5	8.5	3.2	23.8	0.3	0	14.6
	% Welsh population	23.4	27.2	8.4	3.2	23.6	0.3	0	13.8
WhatsApp	n	225	263	131	59	364	17	0	181
	% Population sampled	18.1	21.2	10.6	4.8	29.4	1.4	0	14.6
	% Welsh population	17.6	21.8	10.9	4.8	29.8	1.4	0	13.8
YouTube	n	109	168	234	212	334	2	0	181
	% Population sampled	8.8	13.5	18.9	17.1	26.9	0.2	0	14.6
	% Welsh population	9.9	14.5	19.0	17.0	25.5	0.2	0	13.8
Instagram	n	103	108	73	75	679	21	0	181
	% Population sampled	8.3	8.7	5.9	6.0	54.8	1.7	0	14.6
	% Welsh population	9.1	9.6	6.1	6.0	53.7	1.7	0	13.8
Snapchat	n	90	77	48	54	760	30	0	181
	% Population sampled	7.3	6.2	3.9	4.4	61.3	2.4	0	14.6
	% Welsh population	8.1	7.1	4.2	4.2	60.2	2.4	0	13.8
Twitter	n	46	84	62	93	759	15	0	181
	% Population sampled	3.7	6.8	5.0	7.5	61.2	1.2	0	14.6
	% Welsh population	4.0	7.1	5.1	7.8	60.9	1.3	0	13.8
LinkedIn	n	11	28	47	86	807	79	1	181
	% Population sampled	0.9	2.3	3.8	6.9	65.1	6.4	0.1	14.6
	% Welsh population	0.9	2.3	4.0	7.2	65.3	6.4	0.1	13.8
Twitch	n	3	10	10	25	839	168	4	181
	% Population sampled	0.2	0.8	0.8	2.0	67.7	13.5	0.3	14.6
	% Welsh population	0.3	1.0	1.2	2.3	68.0	13.0	0.3	13.8

[i]Using mid-2015 population estimates for LSOAs by sex, age group (ONS, 2016) and deprivation quintile (Welsh Index of Multiple Deprivation; Welsh Government, 2015).

Table A4. Social media type and user category

Values are unadjusted percentages within the population sampled (n=1,240) and unadjusted percentages weighted on the demographic distribution of the Welsh population.

Type of social media platform	Sample	User category				
		Super user	User	Rare user	Non-user	People without internet access
One or more type listed	n	788	100	51	120	181
	Population sampled %	63.5	8.1	4.1	9.7	14.6
	Welsh population %	64.7	8.1	4.1	9.3	13.8
Social networking	n	622	104	48	285	181
	Population sampled %	50.2	8.4	3.9	23.0	14.6
	Welsh population %	51.0	8.5	3.9	22.8	13.8
Video content	n	279	233	212	335	181
	Population sampled %	22.5	18.8	17.1	27.0	14.6
	Welsh population %	24.6	19.0	17.0	25.6	13.8
Messaging	n	488	131	59	381	181
	Population sampled %	39.4	10.6	4.8	30.7	14.6
	Welsh population %	39.4	10.9	4.8	31.2	13.8
Photo content	n	261	80	81	637	181
	Population sampled %	21.0	6.5	6.5	51.4	14.6
	Welsh population %	23.0	6.9	6.1	50.2	13.8
Microblogging	n	130	62	93	774	181
	Population sampled %	10.5	5.0	7.5	62.4	14.6
	Welsh population %	11.1	5.1	7.8	62.2	13.8

Appendix 3. Social media platform engagement within people with internet access

Values are unadjusted percentages within the population sampled limiting to those with internet access (n=1,059).

Table A5. Social media platform and frequency of use

		Several times a day	Daily	Weekly	Less than weekly	Never	Don't know what it is	Refused
Facebook	n	286	329	105	40	295	4	0
	Population sampled %	27.0	31.1	9.9	3.8	27.9	0.4	0
WhatsApp	n	225	263	131	59	364	17	0
	Population sampled %	21.2	24.8	12.4	5.6	34.4	1.6	0
YouTube	n	109	168	234	212	334	2	0
	Population sampled %	10.3	15.9	22.1	20.0	31.5	0.2	0
Instagram	n	103	108	73	75	679	21	0
	Population sampled %	9.7	10.2	6.9	7.1	64.1	2.0	0
SnapChat	n	90	77	48	54	760	30	0
	Population sampled %	8.5	7.3	4.5	5.1	71.8	2.8	0
Twitter	n	46	84	62	93	759	15	0
	Population sampled %	4.3	7.9	5.9	8.8	71.7	1.4	0
LinkedIn	n	11	28	47	86	807	79	1
	Population sampled %	1.0	2.6	4.4	8.1	76.2	7.5	0.1
Twitch	n	3	10	10	25	839	168	4
	Population sampled %	0.3	0.9	0.9	2.4	79.2	15.9	0.4

Table A6 Social media type and user category

		User category			
		Super user	User	Rare user	Non-user
One or more type listed	n	788	100	51	120
	Population sampled %	74.4	9.4	4.8	11.3
Social networking	n	622	104	48	285
	Population sampled %	58.7	9.8	4.5	26.9
Video content	n	279	233	212	335
	Population sampled %	26.3	22.0	20.0	31.6
Messaging	n	488	131	59	381
	Population sampled %	46.1	12.4	5.6	36.0
Photo content	n	261	80	81	637
	Population sampled %	24.6	7.6	7.6	60.2
Microblogging	n	130	62	93	774
	Population sampled %	12.3	5.9	8.8	73.1

Appendix 4. Use of social media platform types by socio-demographic and status of health

Adjusted proportion (95% confidence intervals) of the population sampled with internet access (n=1,059) adjusting for gender, age group, and deprivation.

		One or more type		Social networking		Video content		Messaging		Photo content		Microblogging	
		Adjusted proportion	CIs	Adjusted proportion	CIs	Adjusted proportion	CIs	Adjusted proportion	CIs	Adjusted proportion	CIs	Adjusted proportion	CIs
Gender	Male	85.7	83.2-88.3	68.7	65.1-72.2	72.2	68.6-75.9	60.9	57.0-64.8	34.0	30.4-37.6	28.2	24.5-31.9
	Female	91.2	88.8-93.5	76.9	73.6-80.2	65.0	61.7-68.4	66.7	63.1-70.3	44.9	41.5-48.2	25.8	22.4-29.2
Age group (years)	16-29	99.6	95.6-100.0	92.1	86.4-97.8	94.5	88.7-100.0	78.2	72.0-84.3	82.6	76.9-88.4	48.7	42.8-54.6
	30-39	98.6	94.8-100.0	87.2	81.8-92.5	83.2	77.7-88.6	85.3	79.5-91.1	57.2	51.8-62.6	39.8	34.2-45.4
	40-49	96.3	92.1-100.0	81.1	75.3-86.9	76.8	70.9-82.8	71.9	65.6-78.1	38.4	32.6-44.3	26.4	20.4-32.5
	50-59	88.1	83.8-92.3	70.1	64.1-76.1	63.4	57.3-69.5	60.0	53.5-66.4	24.3	18.3-30.4	17.0	10.8-23.2
	60-69	75.6	71.0-80.1	50.0	43.6-56.4	42.9	36.3-49.4	45.6	38.7-52.5	10.2	3.7-16.6	7.6	1.0-14.2
	70+	59.8	54.7-64.9	39.3	32.2-46.5	27.3	20.0-34.6	21.3	13.5-29.0	2.7	0.0-9.9	8.5	1.0-15.9
Deprivation	1 (least deprived)	89.0	85.2-92.7	71.0	65.7-76.3	72.6	67.2-77.9	73.7	68.0-79.4	41.6	36.3-46.9	33.5	28.1-39.0
	2	87.4	83.6-91.2	72.5	67.2-77.8	70.7	65.2-76.1	58.1	52.3-63.8	36.8	31.5-42.2	27.2	21.7-32.7
	3	89.6	85.6-93.6	79.1	73.4-84.7	65.2	59.4-70.90	65.4	59.3-71.5	39.4	33.8-45.1	25.3	19.5-31.2
	4	89.6	85.8-93.5	72.4	67.0-77.8	65.9	60.4-71.4	65.9	60.1-71.7	41.7	36.3-47.2	29.3	23.7-34.9
	5 (most deprived)	87.7	83.5-91.8	70.8	65.0-76.6	66.8	60.9-72.7	55.7	49.4-62.0	39.5	33.6-45.3	17.5	11.5-23.6
General health	Average	89.9	87.3-92.4	74.5	71.0-78.1	71.3	67.6-74.9	66.1	62.2-69.9	42.4	38.8-46.0	29.3	25.5-33.0
	High	90.8	87.4-94.3	71.9	67.1-76.7	68.4	63.5-73.3	63.3	58.1-68.5	38.3	33.5-43.1	26.4	21.4-31.4
	Low	84.8	81.5-88.1	72.0	67.4-76.7	63.2	58.5-68.0	61.3	56.3-66.4	37.0	32.3-41.7	23.6	18.7-28.4
Mental wellbeing	Average	89.3	87.5-91.2	73.4	70.8-76.0	69.2	66.5-71.8	65.2	62.3-68.0	40.6	37.9-43.2	27.7	25.0-30.4
	Low	86.1	81.3-90.9	72.3	65.5-79.1	66.0	59.1-73.0	58.3	50.9-65.7	35.2	28.3-42.1	23.5	16.4-30.6
Health-harming behaviours	0	91.2	88.5-93.9	74.2	70.4-78.0	72.5	68.6-76.3	68.7	64.7-72.8	43.1	39.3-46.9	31.0	27.0-34.9
	1	87.8	85.1-90.4	71.9	68.2-75.6	65.6	61.8-69.4	63.1	59.1-67.1	35.3	31.6-39.0	25.2	21.4-29.1
	2-3	84.2	79.6-88.8	73.3	66.9-79.7	65.0	58.4-71.5	53.4	46.5-60.3	44.2	37.8-50.7	20.4	13.8-27.1

Appendix 5. Social media user category by socio-demographic and status of health

Adjusted proportion (95% confidence intervals) of the population sampled with internet access (n=1,059) adjusting for gender, age group and deprivation.

		User category							
		Super users		Users		Rare users		Non-users	
		Adjusted proportion	CIs	Adjusted proportion	CIs	Adjusted proportion	CIs	Adjusted proportion	CIs
Gender	Male	71.8	68.4-75.1	9.4	6.9-12.0	4.6	2.7-6.4	14.3	11.7-16.8
	Female	76.7	73.6-79.8	9.5	7.1-11.8	5.0	3.3-6.8	8.8	6.5-11.2
Age group (years)	16-29	96.2	90.8-100.0	1.6	0.0-5.7	1.8	0.0-4.8	0.4	0.0-4.4
	30-39	93.1	88.1-98.2	4.8	0.9-8.6	0.7	0.0-3.5	1.4	0.0-5.2
	40-49	82.1	76.7-87.6	11.0	6.8-15.1	3.2	0.1-6.2	3.7	0.0-7.9
	50-59	67.3	61.6-72.9	16.1	11.9-20.4	4.6	1.5-7.8	11.9	7.7-16.2
	60-69	53.8	47.7-59.8	12.5	8.0-17.1	9.3	5.9-12.6	24.4	19.9-29.0
	70+	31.3	24.6-38.0	14.5	9.4-19.6	13.9	10.2-17.7	40.2	35.1-45.3
Deprivation	1 (least deprived)	72.7	67.7-77.7	11.9	8.1-15.6	4.4	1.7-7.2	11.0	7.3-14.8
	2	75.7	70.7-80.8	8.4	4.6-12.2	3.3	0.6-6.1	12.6	8.8-16.4
	3	78.0	72.6-83.3	6.7	2.7-10.7	4.9	2.0-7.9	10.4	6.4-14.4
	4	72.5	67.5-77.6	12.2	8.4-16.0	4.9	2.1-7.7	10.4	6.5-14.2
	5 (most deprived)	73.4	67.9-78.9	7.5	3.3-11.6	6.8	3.8-9.9	12.3	8.2-16.5
General health	Average	76.9	73.5-80.2	7.3	4.8-9.9	5.7	3.8-7.6	10.1	7.6-12.7
	High	73.6	69.1-78.1	12.0	8.6-15.4	5.2	2.7-7.8	9.2	5.7-12.6
	Low	71.3	66.9-75.7	10.4	7.1-13.8	3.0	0.6-5.5	15.2	11.9-18.5
Mental wellbeing	Average	75.4	72.9-77.8	9.2	7.3-11.1	4.7	3.4-6.1	10.7	8.8-12.5
	Low	70.0	63.6-76.5	11.0	6.2-15.9	5.0	1.5-8.6	13.9	9.1-18.7
Health-harming behaviours	0	76.4	72.8-80.0	10.1	7.4-12.8	4.7	2.7-6.7	8.8	6.1-11.5
	1	73.4	69.9-76.8	9.1	6.4-11.7	5.3	3.4-7.3	12.2	9.6-14.9
	2-3	71.9	65.9-78.0	8.7	4.1-13.2	3.6	0.3-7.0	15.8	11.2-20.4

Appendix 6. Perceptions on share personal details about health on social media

		Worry about privacy		Total
		Yes	No	
Share personal details about your health on social media (n=104)	Only with friends and family	26	49	75
	% of people only share with friends and family	34.7%	65.3%	73.5%
	With both parties	12	15	27
	% of people share with both parties	44.4%	55.6%	26.5%
Total		38	64	102
%		37.3%	62.7%	100%

GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

Research and Evaluation Division
Public Health Wales
Number 2 Capital Quarter
Tyndall Street
Cardiff CF10 4BZ

Tel: +44(0) 2920 227744
@PublicHealthW

PRIFYSGOL BANGOR UNIVERSITY

Public Health Collaborating Unit
School of Health Sciences
Bangor University
Wrexham Technology Park
Wrexham LL13 7YP

Tel: +44(0)1248 383519
@BangorUni